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EXAMINER	
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ART UNIT	PAPER NUMBER
1791	

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04/13/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/541,691	BOSTANJOGLO ET AL.	
	Examiner	Art Unit	
	SEYED M. MALEKZADEH	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-16 and 18-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-16 and 18-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Claims 11 -16 and 18 -26 are **pending**.

Claims 11 - 6 and 18 -26 stands **rejected**.

Claims 1-10 and 17 are **cancelled**.

Claims 11-13, 19, 21-23, and 25 are **amended**.

In view of the amendment, filed on 01/22/2009, following rejections are **withdrawn** from the previous office action for the reason of record.

- Rejection of claims 12-13, 19, and 21-24 under 35 U.S.C. 112, second paragraph
- Rejection of claims 22- 24 under 35 U.S.C. 102(a and e) as being anticipated by Konter et al. (US 6,405,435)
- Rejection of claims 11- 13, 18- 21, and 25 under 35 U.S.C. 103(a) as being unpatentable over Konter et al. (US 6,405,435) in view of Terkelsen (US 4,289,570)
- Rejection of claims 14-15 rejected under 35 U.S.C. 103(a) as being unpatentable over Konter et al. (US '435) in view of Terkelsen (US '570), and further in view of Schnell et al. (US '177)
- Claims 16 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konter et al. (US '435) in view of Terkelsen (US

'570) as applied to claims 11-13, 18-21, and 25 above, and further in view of Caballero (US '907)

In view of the amendment, filed on 01/22/2009, following new grounds of rejection is necessitated by the applicant's amendment.

New Grounds of Rejection

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 22- 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konter et al. (US 6,405,435) in view of Paulonis et al. (US 4,005,988)

Konter et al. (US '435) teaches a finished gas turbine component comprising a substrate (1) with a single crystal structure including a plurality of profiles (2), a thermally stable filling material layer (3) as an intermediate layer over the profiles (2) of the substrate (1), and a mono-crystalline layer (6) as a third layer material formed over the substrate (1) and the intermediate layer (3), wherein the intermediate layer is made of ceramic material based on Al_2O_3 and/ or SiO_2 and/ or ZrO_2 and therefore, it does not include a single crystal or directional structure, and also the intermediate layer is applied via a different production step than production step of the substrate (1) or single crystal build up layer (6). (See column 3, lines 14-20 and lines 61-67) Therefore, the prior art teaches a substrate (1) having a single crystal structure, an intermediate layer (3) having no single crystal or directional structure applied to the substrate (1) and a third layer (6) with a single crystal structure formed on the intermediate layer (3). (See figure 5). Furthermore, Konter et al. (US '435) disclose the composition of the layer material (6) corresponds to the material composition of the substrate (1).

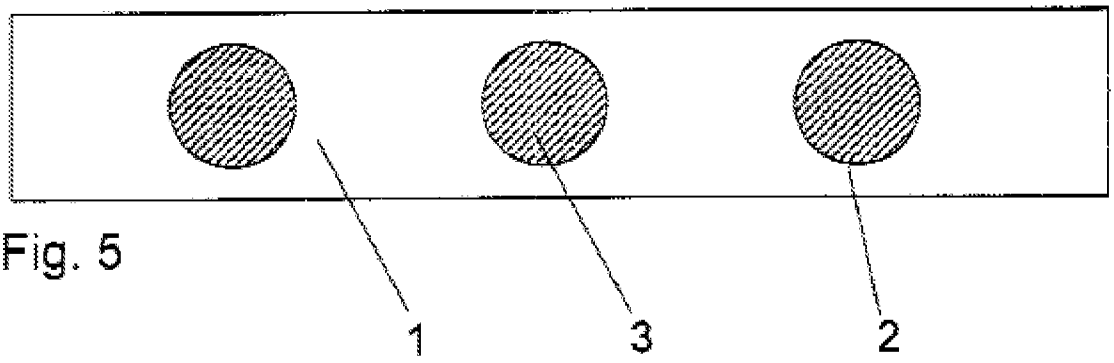

Fig. 5

Konter et al. (US '435) disclose all the product limitations of a component formed from a metallic super-alloy; **however,** Paulonis et al. (US '988) **fail** to teach the thermally stable filling material layer (3) as an intermediate layer is a metallic material.

In the analogous art, Paulonis et al. (US '988) discloses a diffusion bonding assembly which comprises two nickel-base super-alloy substrates having matched surfaces to be joined having matched surfaces to be joined, a thin, lamellar interlayer sandwiched between the surfaces in which the overall interlayer composition having as its metal the same basis **metal** as the super-alloy. (See column 4, lines 15-30 and column 6, lines 15-23) Further, Paulonis et al. (US '988) teach the composition of the interlayer preferably and generally should be tailored to the alloys being joined. (See column 1, lines 46- 52) Moreover, Paulonis et al (US '988) disclose the simple binary alloy was used, there remained some chemical heterogeneity at the joint interface. Such a simple interlayer might be satisfactory in some instances, e. g. where ultra-thin inter-layers were possible allowing rapid homogenization. (See column 2, lines

64- 68) However Paulonis et al (US '988) does not explicitly disclose the crystalline structure of the interlayer, By the description of the prior art; it is conferred that the intermediate layer can include a structure which is not single crystal or directional structure.

It would have been obvious for one of ordinary skill in the art at the time of applicant's invention to modify the teachings of Konter et al. (US '435) through providing a metallic intermediate layer for the super-alloy component **in order to** further improve the quality of the finished joints of the component layers by promoting the homogeneity of the component through reducing the bonding cycle time and bonding temperature, as suggested by Paulonis et al. (US '988)

In respect to the recitation of claim 24 that "the intermediate is generated electrochemically", the limitation is directed to the process of forming a product component, and a process step of forming a product or apparatus component is treated as **intended use**.

Intended use has been continuously held not to be germane to determining the patentability of the apparatus, *In re Finsterwalder*, 168 USPQ 530.

The manner or method in which a machine is to be utilized is not germane to the issue of patentability of the machine itself, *In re Casey*, 152 USPQ 235,238.

Purpose to which apparatus is to be put and expression relating apparatus to contents thereof during intended operation are not significant in determining patentability of an apparatus claim, *Ex parte Thibault*, 164 USPQ 666.

A recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations, *EX parte Masham*, 2 USPQ2d 1647.

Claims 11-13, 18, 20-21, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konter et al. (US 6,405,435) in view of Terkelsen (US 4,289,570) and further in view of Paulonis et al. (US 4,005,988)

Konter et al. (US '435) teach a method for producing or repairing cooling channels in mono-crystalline gas turbine components comprising the steps of casting a mono-crystalline gas turbine component as a manufacturing step for providing a substrate (1) having a single crystal structure in which the substrate (1) includes a plurality of profiles (2) created during casting, applying a thermally stable filling material layer (3) as an intermediate layer over the profiles (2) of the substrate (1), creating a mono-crystalline layer (6), epitactically, above the thermally stable filling material layer (3) as a step of epitaxially growing a single crystal buildup layer (6) material on the

intermediate layer (3) in which the single crystal build up layer (6) is at least partially isolated from the substrate (1) by the intermediate layer (3) wherein the intermediate layer is made of ceramic material based on Al_2O_3 and/ or SiO_2 and/ or ZrO_2; therefore, the intermediate layer does not include a single crystal or directional structure, and also the intermediate layer is applied via a different production step than production step of the substrate (1) or single crystal build up layer (6). (See column 4, lines 61-67, and column 5, lines 1-5; also see lines 14-20, column 3)

Moreover, the prior art teaches the substrate (1) comprises a turbine blade, and further, the material composition of the intermediate layer (3) corresponds to the material composition of the substrate (1), and a composition ratio of constituents for the intermediate layer (3) is compatible with a main composition ratio of main constituents of the substrate (1).

Also, the intermediate layer separate the intermediate layer with the epitaxially grown over-layers, and since the intermediate layer include a different structure with the substrate, any structure characteristics of the substrate is not copied into the intermediate layer.

However, the prior art is silent about any structure defect of the surface substrate and the intermediate includes a metallic structure, **as claimed in claims 11 and 25**, and also the prior art fails to teach the intermediate layer includes a directional micro-structure, **as claimed in claim 18**.

In the analogous art, Terkelsen (US '570) teaches a method of directionally solidifying a metal melt into an article with controlled crystallographic orientation using a seed as a substrate and growing epitaxial layers on the seed through epitaxial growth comprising the steps of altering the composition of at least a portion of the seed using an element which lowers the melting point and which promotes dissolution in the melt of undesirable surface compounds where the seed is adapted to contact the melt, providing a mold to contain the seed and to receive the melt, pouring molten metal into the mold to contact the seed and thereby melt the surface portion of the seed where its composition is altered, and directionally solidifying the melt to promote epitaxial growth from the seed. (See column 4, lines 64-68 and column 5, lines 1-7)

Further, Terkelsen (US '570) teaches adding elements such as boron to the substrate has the advantageous effect of producing a fluxing action on any oxide or other contamination layers as intermediate layers which are formed on the seed surface, (see lines 43-46, column 3) separate from the epitaxial layers and also having a directional structure.

Also, Terkelsen (US '570) discloses the provision of a surface composition which enhances the dissolution, in the molten metal of the alloy being cast, of undesirable surface compounds which interfere with epitaxy, (See column 1, lines 63-67) and further, the entire seed has a composition with either the depressed melting point or surface film dissolving characteristics. It is, of

course, required that the seed have a crystallographic structure and nature from which epitaxial solidification of the melt can take place, and this would prevent the use of seeds of grossly dissimilar nature. (See lines 26-32, column 4)

Thus, the prior art teaches a structure defect at a surface of the substrate in which the single crystal buildup layer being isolated from the structural defect of the substrate by the intermediate layer wherein the structure defect at the surface of the substrate is not copied into the intermediate layer.

In another analogous art, Paulonis et al. (US '988) discloses a method of forming a diffusion bonding assembly in which the formed component comprises two nickel-base super-alloy substrates having matched surfaces to be joined having matched surfaces to be joined, a thin, lamellar interlayer sandwiched between the surfaces in which the overall interlayer composition having as its metal the same basis **metal** as the super-alloy. (See columns 1, lines 59-68; column 3, lines 65- 68; also, column 4, lines 15-30 and column 6, lines 15-23) Further, Paulonis et al. (US '988) teach the composition of the interlayer preferably and generally should be tailored to the alloys being joined. (See column 1, lines 46- 52) Moreover, Paulonis et al (US '988) disclose the simple binary alloy was used, there remained some chemical heterogeneity at the joint interface. Such a simple interlayer might be satisfactory in some instances, e. g. where ultra-thin inter-layers were possible allowing rapid

homogenization. (See column 2, lines 64- 68) However Paulonis et al (US '988) does not explicitly disclose the crystalline structure of the interlayer, By the description of the prior art; it is conferred that the intermediate layer can include a structure which is not single crystal or directional structure.

Therefore, **it would been obvious** for one of ordinary skill in the art at the time of applicant's invention to modify the process steps as taught by Konter et al. (US '435) through providing a structure defect on the surface substrate and growing the intermediate layer with a directional microstructure, as suggested by Terkelsen (US '570) **in order to** produce a structurally uniformed finished single crystal product with high quality and applicable properties and characteristics.

Also, **It would have been obvious** for one of ordinary skill in the art at the time of applicant's invention to modify the process steps as taught by Konter et al. (US '435) and Terkelsen (US '570) through applying a **metallic** intermediate layer **in order to** further improve the quality of the finished joints of the produced component layers by promoting the homogeneity of the component through reducing the bonding cycle time and bonding temperature during the manufacturing process, as suggested by Paulonis et al. (US '988)

Claims 14-15 rejected under 35 U.S.C. 103(a) as being unpatentable over Konter et al. (US 6,405,435) in view of Terkelsen (US 4,289570) and

Paulonis et al. (US 4,005,988), as applied to claims 11-13, 18, 20, and 21, and 25, and further in view of Schnell et al. (US 2003/0066177)

Combined teachings of Konter et al. (US '435), Paulonis et al. (US '988), and Terkelsen (US '570) teach all the structural limitations of a process for producing single-crystal structure from metallic super-alloys, as claimed in claims 11-13, 18, 20-21, and 25; **however,** the prior arts **fail** to teach a heat treatment step in which transforms at least part of the intermediate layer with the substrate into a region having a crystalline structure.

In the analogous art, Schnell et al. (US 2003/0066177) teach a method of joining or repairing cracks or gaps in a single crystal article made of a Nickel based supper alloys by means of isothermal, epitaxial single crystal solidification of a brazing alloy wherein the brazing alloy comprising γ'-phase forming elements and at least boron as melting point depressant and base material comprises Nickel and other additives (see claims 1 and 2) in which the process include a step of heat treatment of the isothermal solidification at a temperature of 1120°C - 1160°C for 8 to 20 hours, preferably, at a temperature of 1140°C for reasons of in-situ adjusting of the micro-structure of the brazed joint; also, there can be a heat treatment of 1180°C for 30 minutes after the heat treatment. Therefore, the prior art provides a heat treatment step in which transforms at least part of the intermediate layer with the substrate into a region having a crystalline structure. (See paragraphs [0012] and [0013])

It would have been obvious for one of ordinary skill in the art at the time of applicant's invention to modify the process steps as taught by combined teachings of Konter et al. (US '435), Paulonis et al. (US 4,005,988), and Terkelsen (US '570) through providing a heat treatment step in which the step transforms at least part of the intermediate layer with the substrate into a region having a crystalline structure, as suggested by Schnell et al. (US '177) **in order to** maximize the strength of the brazed joints of the single crystal components.

Claims 16, 19, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konter et al. (US '435) in view of Terkelsen (US '570) and Paulonis et al. (US '988) as applied to claims 11-13, 18, 20-21, and 25 above, and further in view of Caballero (US 5,213,907)

Combined teaching of Konter et al. (US 435) in view of Terkelsen (US 570) and Paulonis et al. (US '988) disclose all the process limitations of a process for producing single–crystal structure from metallic super-alloys as discussed above; **however**, **fails** to teach the intermediate layer is generated by a material application process different than the process of forming the single crystal build up layer, as claimed in claim 19, specifically generated by an electrochemical process, as claimed in claim 16, or by an electro-deposition process, as claimed in claim 26.

In the analogous art, Caballero et al. ('907) discloses epitaxial deposition of a metal alloy such as Ni-B, Co-B, Ni-Co, Ni-Fe, Co-Fe, Ni-Co-Fe

which are comparable with intermediate layer by an electrochemical process on a surface of a substrate. (See lines 14-23, column 2)

Also, Caballero ('907) teaches a method of electrodepositing metal alloys which causes the alloy to diffuse into the surface of a substrate and chemically bond to the substrate at the interface between the alloy and the substrate (See lines 28-34, column 2). Furthermore, Caballero ('907) teaches the metal alloy, which is deposited by the electrodepositing method is dense, hard, ductile and highly reflective (See lines 21-25, column 2)

Also, Caballero et al. ('907) teach the advantages of employing an electro-chemical or electro-deposition process for the layer's deposition in order to improve the complexity of the deposition process in which the layers can be deposited quickly and easily. (See lines 37-41, column 2)

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the combined teachings of Konter et al. (US 435) in view of Terkelsen (US 570) and Paulonis et al. (US 4,005,988) through generating an intermediate layer by an electro-chemical or electro-deposition process in order to apply deposition process of intermediate layer quicker and easier, as suggested by Caballero ('907).

Response to Arguments

Applicant's arguments with respect to claims 11-16 and 18-26 have been considered but are moot in view of the new grounds of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Masoud Malekzadeh whose telephone number is 571-272-6215. The examiner can normally be reached on Monday – Friday at 8:30 am – 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven P. Griffin, can be reached on (571) 272-1189.

The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance form a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SEYED M. MALEKZADEH/

Examiner, Art Unit 1791

/Steven P. Griffin/

Supervisory Patent Examiner, Art Unit 1791